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# The South American *Dictyophragmus* (Brassicaceae)

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Two of the approximately 350 South American species of Brassicaceae (Cruciferae) have broadly flattened, linear to linear-lanceolate fruits, broadly winged seeds, and accumbent cotyledons. The first is a Peruvian species described by Muschler (1908) as *Streptanthus englerianus* Muschler and was later transferred by Schulz (1933) to the monotypic *Dictyophragmus* O. E. Schulz. The second is a recently discovered Argentinian species described by Romanчук (1982) as *Sisymbrium punense* Romanчук. Except for the superficial resemblance in fruits and seeds, the two species have little in common with the exclusively North American *Streptanthus* Nuttall. Because of the common occurrence in unrelated genera of the Brassicaceae of broadly flattened fruits, broadly winged seeds, and accumbent cotyledons, it is safe to conclude that this character combination evolved independently several times within the family.

*Sisymbrium punense* and *Dictyophragmus englerianus* (Muschler) O. E. Schulz are glabrous annuals with auriculate to amplexicaul cauline leaves, small, white flowers, confluent nectar glands, entire stigmas, broadly flattened fruits, accumbent cotyledons, and broadly winged seeds. Despite the significant morphological differences and geographical disjunction, the two species are more closely related to each other than to any South American Brassicaceae. In my opinion, their relationship is better understood by placing them in one genus than by recognizing two monotypic genera, of which one should be segregated as new.

Perhaps the nearest relative of *Dictyophragmus* is the South American *Eremodraba* O. E. Schulz, a genus of two species, one of which is narrowly endemic to southern Peru and the other restricted to adjacent northern Chile (Al-Shehbaz, 1990). Species of these genera are glabrous annuals with amplexicaul cauline leaves, small flowers, confluent nectar glands, entire stigmas, and flattened fruits. On the basis of differences in the cotyledonary position, Schulz (1936) placed *Dictyophragmus* in the tribe Arabideae and *Eremodraba* in the Sisymbrieae. Students of the Brassicaceae now place much less emphasis on the cotyledonary position, and evidently the boundaries between the Arabideae and Sisymbrieae are highly artificial. It is even doubtful that

these tribes are distinct or natural. In my opinion, one should be cautious about the rigid use of characters such as the cotyledonary position in assessing relationships at higher taxonomic levels within the family. In addition to the differences in cotyledonary position, *Eremodraba* has yellow flowers and wingless, plump, oblong seeds. In contrast, *Dictyophragmus* has white flowers and broadly winged, flattened, orbicular to broadly ovate seeds.

## Systematic Treatment

***Dictyophragmus*** O. E. Schulz, Bot. Jahrb. Syst. 66: 92. 1933. TYPE: *D. englerianus* (Muschler) O. E. Schulz.

Annual herbs, glabrous throughout. Cauline leaves sessile, auriculate to amplexicaul at base. Inflorescences bracteate or ebracteate racemes, elongated in fruit; flowers small. Sepals oblong, erect, nonsaccate, glabrous. Petals white, obovate or spatulate; claws papillose or glabrous. Nectar glands confluent, low, surrounding the bases of lateral filaments, subtending those of the median ones. Stamens 6; filaments glabrous or papillose at base. Fruits flattened parallel to the septum, linear to linear-lanceolate, glabrous, torulose; valves with a prominent midvein or inconspicuously veined; septum complete, veinless or prominently veined; stigma entire. Seeds flattened, reticulate, uniseriately arranged, broadly winged all around except at the proximal end; cotyledons accumbent.

## Key to the species

- 1a. Inflorescences ebracteate; fruits 1.5–3(–3.6) cm long; valves with an inconspicuous midvein; septum with prominent, anastomosing longitudinal veins; seeds 3–8 per locule; filaments and claws papillose at base . . . . . 1. *D. englerianus*
- 1b. Inflorescences bracteate; fruits (3–)3.5–7 cm long; valves with a prominent midvein; septum veinless; seeds 12–25 per locule; filaments and claws glabrous . . . . . 2. *D. punensis*

1. ***Dictyophragmus englerianus*** (Muschler) O. E. Schulz, Bot. Jahrb. Syst. 66: 92. 1933. *Streptanthus englerianus* Muschler, Bot. Jahrb.

Syst. 40: 269. 1908. TYPE: Peru. Mollendo, 100–200 m, 10 Oct. 1902, *A. Weberbauer 1463* (holotype, B).

Annual herbs, glabrous throughout. Stems erect, simple or branched, 4–25 cm tall. Lowermost leaves subsessile to short petiolate, oblong to oblanceolate, repand-dentate, 1.5–5 cm long, 4–18 mm wide; cauline leaves few, smaller, auriculate to amplexicaul at base. Sepals narrowly oblong, 2–2.5 mm long, 0.9–1.2 mm wide. Petals obovate, abruptly narrowed to the claw, 4–6 mm long, 1.2–1.8 mm wide; claws slender, conspicuously papillose. Filaments erect, white, 2.5–3 mm long, papillose at base; anthers narrowly oblong, 0.9–1.1 mm long. Fruiting pedicels divaricate, straight to slightly curved upward, 3–6 mm long. Fruits linear-lanceolate to linear, torulose, straight, 1.5–3(–3.6) cm long, 3–4 mm wide; valves prominently transverse-reticulate on the inside, obscurely veined on the outside, the midvein inconspicuous; septum with prominent, anastomosing longitudinal veins; style obsolete or rarely to 0.4 mm long. Seeds 3–8 per locule, suborbicular to broadly ovate, 2.5–3 mm diam., reticulate; wings 0.3–0.6 mm wide.

Endemic to a small coastal area in Depto. Arequipa, Peru, where it grows on sandy plains and hills at altitudes up to 400 m.

*Specimens examined.* PERU. DEPTO. AREQUIPA: Prov. Camaná, between Camaná and Ocoña, ±40 km to the north, *Ferreyra 8870* (GH); between Camaná and Ocoña, *Ferreyra & Ono 20334* (GH); same area, *Ferreyra 6455* (GH, US); Mollendo, hillside directly back of the port, *Johnston 3555* (GH, K); Lomas of Ocoña, ca. 12 km S of Ocoña (km 788 S of Lima on Pan American Hwy.), *Dillon & Dillon 3858* (F, MO); 5 km E of Mollendo, *Worth & Morrison 15762* (F, MO).

**2. *Dictyophragmus punensis*** (Romanczuk) Al-Shehbaz, comb. nov. Basionym: *Sisymbrium punense* Romanczuk, *Darwiniana* 24: 87. 1982. TYPE: Argentina. Prov. Jujuy: Depto. Cochinocha, Abra Pampa, Cuesta Azul Pampa, 21 Feb. 1952, *R. Diers 132* (holotype, SI).

Annual herbs, glabrous throughout, sometimes glaucous. Stems erect, branched, 8–30(–40) cm tall.

Lowermost cauline leaves lanceolate, sessile, dentate to repand or rarely entire, 2–6 cm long, 3–8 mm wide; middle and upper cauline leaves progressively smaller and becoming entire upward, strongly auriculate to amplexicaul, the auricles up to 5 × 3 mm. Inflorescences lax racemes, bracteate throughout, elongated considerably in fruit; rachis straight to flexuous; bracts auriculate, longer to shorter than the pedicels. Sepals oblong, 2–4 mm long, 0.9–1.2 mm wide. Petals spatulate, attenuate to a clawlike base, 4–5 mm long, 0.7–1.3 mm wide. Filaments erect, white, 2–3 mm long; anthers oblong, 0.8–1.5 mm long. Fruiting pedicels curved upward or rarely straight and divaricate, 5–20(–30) mm long. Fruits narrowly linear, straight to slightly curved, (3–)3.5–7 cm long, 2.5–3 mm wide; valves with a prominent midvein and obscurely reticulate lateral veins, longitudinally striate on the inside; septum hyaline, veinless; style 0.8–1.8 mm long. Seeds 12–25 per locule, suborbicular, 2–2.5 mm diam., reticulate; wing 0.4–0.8 mm wide.

A very rare Argentinian species endemic to Prov. Jujuy, where it grows at altitudes of 3,400 to 3,800 m.

*Specimens examined.* ARGENTINA. PROV. JUJUY: Depto. Humahuaca, Iturbe, *Cabrera, Frangi, de Frangi, Gayoso, Kiesling & Zardini 21394* (BAA); Cuesta de Azul Pampa, *Ruthsatz 374/17* (BAA, MO); Mina El Aguilar, Epinazo del Diablo, *Ruthsatz 23/1* (BAA, MO), *Ruthsatz 23/8* (BAA); Depto. Purmamarca, Tascal, *Cabrera 15139* (BAA, GH).

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